

1 **WHAT IS CLAIMED IS:**

2 1. A lighting device composed of a thin LED module, the lighting
3 device comprising:

4 a LED module (10) having a top face and a bottom face, wherein the
5 bottom face is adapted to electrically connect to conductive wires and the top
6 face emits light; the LED module (10) comprising:

7 a conductive layer (13) with multiple sections;

8 multiple LED chips (14) mounted respectively between
9 adjacent sections of the conductive layer (13); and

10 an encapsulant (15) formed on the conductive layer (13) to
11 cover and protect the multiple LED chips (14);

12 a thermally conductive layer (20) having a flat top side attached to
13 the bottom face of the LED module and a flat bottom side; and

14 a heat sink (30) having an outer surface area and attached to the
15 bottom side of the thermally conductive layer (20);

16 when the lighting device operates, heat generated by the LED
17 module (10) is transferred through the thermally conductive layer (20) to the
18 heat sink (30) and efficiently radiated to a low lighting device temperature.

19 2. The lighting device as claimed in claim 1, wherein the LED chips
20 (14) are densely arranged on the conductive layer (13).

21 3. The lighting device as claimed in claim 1, wherein the heat sink
22 comprises:

23 a sealed chamber (31) having an inner face attached to the bottom
24 side of the thermally conductive layer (20), an outer face and an inside

1 surface;
2 a vaporable liquid (33) held inside the sealed chamber (31) near the
3 inner face to absorb heat from the LED module (10); and
4 multiple fins (32) attached to the outer face of the sealed chamber
5 (31) to increase outer surface areas of the heat sink (31).

6 4. The lighting device as claimed in claim 2, wherein the heat sink
7 comprises:

8 a sealed chamber (31) having an inner face attached to the bottom
9 side of the thermally conductive layer (20), an outer face and an inside
10 surface;

11 a vaporable liquid (33) held inside the sealed chamber (31) near the
12 inner face to absorb heat from the LED module (10); and
13 multiple fins (32) attached to the outer face of the sealed chamber
14 (31) to increase outer surface areas of the heat sink (31).

15 5. The lighting device as claimed in claim 3, wherein the thermally
16 conductive layer (20) is nonconductive in electricity and is made of room
17 temperature vulcanization (RTV) silicon.

18 6. The lighting device as claimed in claim 4, wherein the thermally
19 conductive layer (20) is nonconductive in electricity and is selectively made
20 of room temperature vulcanization (RTV) silicon.

21 7. The lighting device as claimed in claim 3, wherein the thermally
22 conductive layer (20) is nonconductive in electricity and is made of room
23 temperature vulcanization silicon further containing ceramic powder.

24 8. The lighting device as claimed in claim 4, wherein the thermally

- 1 conductive layer (20) is nonconductive in electricity and is made of room
- 2 temperature vulcanization silicon further containing ceramic powder.